Personal nutritionist Diet recommendation system based on user health information

at

SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

Submitted in partial fulfillment of the requirements for the award of

Bachelor of Engineering degree in Computer Science and Engineering

By

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **EDARA AVINASH BABU(Reg.No - 39110292) and AKULA SAI KRISHNA(Reg.No - 39110038)** who carried out the Project Phase-2 entitled **"Personal nutritionist Diet recommendation system using based on user health information"** under my supervision from January 2023 to April 2023.

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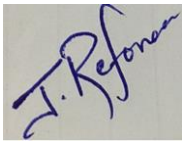
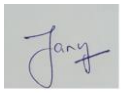


Internal Examiner



External Examiner

DECLARATION

I, **EDARA AVINASH BABU(Reg.No - 39110292),** hereby declare that the Project Phase-2 Report entitled **"PERSONAL NUTRITIONIST DIET RECOMMENDATION BASED ON USER HEALTH INFORMATION"** done by me under the guidance of **Dr. A. C. SANTHA SHEELA, M.E.,Ph.D.,** is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in **Computer Science and Engineering**.

DATE:20.4.2023

PLACE:Chennai

SIGNATURE OF THE CANDIDATE

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ABSTRACT

People make decisions related to food every day. They all think about what to eat, where to eat, how much nutritional value this food has, can this make me lose weight, can this food make me healthy and other questions. Recommendation systems help the user to make fast decisions in these complex information spaces. These systems include informative content and services, which persuade users to alter their behavior. This recommender could exploit the nutritional values of the food to inform its recommendations. Individualized dietary and nutritional recommendations will be generated by the system when it has been trained on a large dataset of user inputs. Our technology will not only provide individualized diet programmers, but it will also have the capability of modifying its suggestions in real time in response to user input. This will make dietary and nutritional planning more flexible and responsive. The project's overarching objective is to facilitate consumers' access to and consumption of healthful foods while simultaneously fostering long-term viability. We think we can make a big difference in the realm of nutrition and assist people in meeting their dietary objectives by using machine learning.

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LIST OF ACRONYMS AND ABBREVIATIONS

1	KNN	K-Nearest Neighbor
2	IoMT	Internet of Medical Things
3	RF	Random Forest
4	DT	Decision Tree
5	R-CNN	Regions with convolutional neural networks

CHAPTER 1

INTRODUCTION

1.1 GENERAL:

Inadequate and inappropriate intake of food is known to cause various health issues and diseases. Due to lack of concise information about healthy diet, people have to rely on medicines instead of taking preventive measures in food intake. Due to diversity in food components and large number of dietary sources, it is challenging to perform real-time selection of diet patterns that must fulfill one’s nutrition needs. Particularly, selection of proper diet is critical for patients suffering from various diseases. Recommender system has been widely used in recent days, in the field of food recommendation. Much of the attention in the diet and nutrition is being paid to diet management systems, which have been replacing traditional paper-and-pen methods. These systems include informative content and services, which persuade users to alter their behavior. Due to the popularity of these diet monitoring facilities, these systems hold a vast amount of user preference information, which could be harnessed to personalize interactive features and to increase engagement with the system and the diet program. One such personalized service, ideally suited to informing diet, is a food recommender. This recommender could exploit the nutritional values of the food to inform its recommendations. The goal of the application is to provide a platform where users find their favorite food and its nutritional value. This is useful for anyone who is health conscious or wants to lose weight. This application can be used as a standalone application or it can also be used as a part of a more sophisticated application. The application can help people who like to eat milk or fish. The application is targeted towards a local audience, for now, and as of present it can only be used as a web application that recommends food based in their nutritional value

Balanced Diet

A healthy balanced diet meets each of a person's nutrient needs. To remain healthy, humans require a specific number of calories and nutrients. A balanced diet provides an individual all the nutrition they need without exceeding the daily calorie allowance.

People can consume the nutrients and calories they require by eating a balanced diet while avoiding junk food or other foods with low nutritional value.

Previously, the United States Department of Agriculture (USDA) advised adhering to the food guide pyramid. Yet, given the advancements in nutritional research, it is now advised to construct a healthy plate using items from all five food categories. The USDA recommends that veggies and fruits should comprise half of a human's plate.

Grain and protein should make up the remaining half. They advise including a dish of low-fat dairy or another source of the nutrients present in dairy with each meal

Elements Of A Balanced And Nutritious Diet

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A nutritious diet should include items from all five of these food groups:

- **Vegetables**

People should select a variety of veggies to receive essential nutrients and prevent dietary monotony. Furthermore, the USDA advises Trusted Source persons to consume veggies from each of the five groupings at least once each week. Vegetables can be eaten either raw or cooked.

It's crucial to keep in mind nevertheless that preparing veggies depletes them somewhat nutritionally. Additionally, some techniques, like deep-frying, can add unhealthy fats to a dish. The vegetable group includes five subgroups: leafy greens, starchy vegetables, red or orange vegetables, other vegetables such as eggplant or zucchini, and beans and peas.

- **Fruits**

Fruits are wholesome, create a delectable snack or dessert, and can quell a sweet desire. Seasonal fruits grown locally are more nutrient-dense and fresher than foreign fruits. Fruits have a lot of sugar, but it's natural sugar. Fruits also include fiber and other micronutrients, unlike candy and many sugary pastries.

This indicates that they will increase the bodies natural supply of vital vitamins, minerals, and antioxidants while being less probable to occur in a sugar rise. Your doctor or nutritionist can provide guidance on the best fruits to choose, how much to consume, and when if you have diabetes.

- **Grains**

Although refined white flour is used in many breads and baked items, it is not particularly nutritious. This is due to the fact that a large portion of the nutrition is found in the grain's hull, or outer shell, which manufacturers remove during processing. Products made from whole grains contain the complete grain, including the hull. They add extra fibre, vitamins, and minerals.

Whole grains are frequently thought to enhance the flavour and texture of a dish. A helpful diet suggestion is to try moving from white breads, pastas, and rice to whole grain alternatives.

- **Protein**

According to the 2015-2020 Dietary Guidelines for Americans, everyone should regularly consume protein that is high in nutrients. According to the recommendations, a human's dish should contain a fifth of this macronutrient.

Lean beef and pork, chicken and turkey, fish, beans, peas, and legumes are all good sources of protein. Protein is mostly found in meat and soybeans and is necessary for a number of processes, including muscle growth and development.

- **Dairy**

Products made from dairy and fortified soy are essential sources of calcium. Whenever practical, the USDA advises choosing low-fat varieties.

Ricotta or cottage cheese, low-fat milk, yoghurt, and soy milk are examples of low-fat cheese and soy goods. People who are lactose intolerant can pick low-lactose or lactose-free products or calcium as well as other dietary components based on soy.

Diet Recommendation System

The term "nutrition informatics" refers to the intersection of information technology (IT), information sciences, and nutrition. Registered dietitians and dietetic technicians can now practice in this area and generate income for health care using this innovative area of health informatics. The phrase "nutrition informatics" was first used in a scientific context in 1996, although nutritionists have been using technologies and implementing nutritional values for decades.

In 1962, the first publication demonstrating the possible application of computers to analyze dietary consumption appeared in print. IT has been used in the healthcare field to promote medical studies through the recycling of data, establish patient care through the use of electronic health records, and gather population figures through gathering of personal health information.

Additionally, specific electronic technologies have been used by dietitians to manage patient tray service, indexing, and nutrient assessment. Despite the fact that most people are aware of the importance of maintaining nutritious eating habits, urban lifestyles and/or a lack of motivation to invest mental effort in provision of food cause them to be more likely to overlook appropriate practices.

People are unable to consume healthful foods because of these obstacles. One of the key technologies used in the field of nutrition informatics is called nutrition recommendations systems (NRS). These are investigated as a useful tool to assist users in altering their eating habits and achieving the goal of making healthier food decisions.

NRS not only suggests users' dietary preferences, but it also suggests alternatives for a healthy diet; in addition, it can suggest a suitable diet and encourage eating behavior, identify health issues, and result in changing user behavior.

In general, recommendation systems have evolved a technology that is efficient and effective for extracting useful information and then using it effectively. A recommender system can suggest new things to consumers and forecast their preferences for unrated goods. Technical specifications and appropriate design based on system kinds and functions determine these systems' capacity. In order to create personalized recommendations, a number of different techniques have been proposed.

These variations in applied techniques and design may result in the creation of different types of recommendation systems, such as collaborative filtering recommender systems (CF), content-based recommender systems (CB), knowledge-based recommender systems (KBS), and hybrid recommender systems (HRS).

There hasn't been a thorough examination into NRS and their traits. Reviewing nutrition recommender system with an emphasis on their traits, varieties, and evaluation techniques is the goal of this work.

Objective Of The Project

The project makes use of a dataset that accurately represents the amounts of different nutrients. In response to the circumstance, we have worked to create a program that advises people to follow a healthy diet. Only three categories—weight loss, weight gain, and healthy—are included in the suggested goods.

In most modern nations, obesity and inactivity are developing issues that place strain on both the public health care system and individual residents. Future efforts to address this issue will benefit from resources that encourage and support individual weight management. But for them to work, they must be accepted by the users and live up to their expectations.

1.2 MACHINE LEARNING:

Machine learning is an application of artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed. Machine learning focuses on the development of computer programs that can access data and use it learn for themselves.

The process of learning begins with observations or data, such as examples, direct experience, or instruction, in order to look for patterns in data and make better decisions in the future based on the examples that we provide. The primary aim is to allow the computers learn automatically without human intervention or assistance and adjust actions accordingly.

SOME MACHINE LEARNING METHODS

Machine learning algorithms are often categorized as supervised or unsupervised. Supervised algorithms require a data scientist or data analyst with machine learning skills to provide both input and desired output, in addition to furnishing feedback about the accuracy of predictions during algorithm training. Data scientists determine which variables, or features, the model should analyze and use to develop predictions. Once training is complete, the algorithm will apply what was learned to new data. Unsupervised algorithms do not need to be trained with desired outcome data. Instead, they use an iterative approach called deep learning to review data and arrive at conclusions. Unsupervised learning algorithms -- also called neural networks -- are used for more complex processing tasks than supervised learning systems, including image recognition, speech-to-text and natural language generation. These neural networks work by combing through millions of examples of training data and automatically identifying often subtle correlations between many variables. Once trained, the algorithm can use its bank of associations to interpret new data. These algorithms have only become feasible in the age of big data, as they require massive amounts of training data.

Machine learning algorithms are often categorized as supervised or unsupervised.

- **Supervised machine learning algorithms** can apply what has been learned in the past to new data using labeled examples to predict future events. Starting from the analysis of a known training dataset, the learning algorithm produces an inferred function to make predictions about the output values. The system is able to provide targets for any new input after sufficient training. The learning algorithm can also compare its output with the correct, intended output and find errors in order to modify the model accordingly.

- In contrast, **unsupervised machine learning algorithms** are used when the information used to train is neither classified nor labeled. Unsupervised learning studies how systems can infer a function to describe a hidden structure from unlabeled data. The system doesn't figure out the right output, but it explores the data and can draw inferences from datasets to describe hidden structures from unlabeled data.

- **Semi-supervised machine learning algorithms** fall somewhere in between supervised and unsupervised learning, since they use both labeled and unlabeled data for training – typically a small amount of labeled data and a large amount of unlabeled data. The systems that use this method are able to considerably improve learning accuracy. Usually, semi-supervised learning is chosen when the acquired labeled data requires skilled and relevant resources in order to train it / learn from it. Otherwise, acquiring unlabeled data generally doesn't require additional resources.

- **Reinforcement machine learning algorithms** is a learning method that interacts with its environment by producing actions and discovers errors or rewards. Trial and error search and delayed reward are the most relevant characteristics of reinforcement learning. This method allows machines and software agents to automatically determine the ideal behavior within a specific context in order to maximize its performance. Simple reward feedback is required for the agent to learn which action is best; this is known as the reinforcement signal.

CHAPTER 2

LITERATURE SURVEY

[1] The aim of this proposal is to create a virtual nutritionist and provide an effective diet. The majority of food types are represented in the database. The data is trained using the model framework that is developed based on nutritionists' previous analysis results, and the items and quantities that users must eat in each time period are accurately recommended, including breakfast, lunch, and dinner. Finally, the training process can clearly demonstrate that the model has been correctly trained, and the generated menu can be compared with the nutritionist to achieve good results. The virtual nutritionists will provide good dietary advice and dietary guardians to each patient based on the results of the nutritional assessment.

[2] In this paper, the Android platform is examined in greater depth, with the goal of understanding the future scope of Android and implementing Text To Speech and vice versa. The Android platform is used in this paper to propose an innovative Fitness Tracking app. The app would assist users in leading a healthier lifestyle and eating more nutritious foods. The proposed app provides information about nutrition that a person should have by eating a well-balanced diet, as well as an outline for future research and development of the application.

[3] Personal Intelligent Nutritionist (or PIN), a prototype system for intelligent nutrition assessment and meal planning, is briefly described and evaluated in this paper. It aims to automate the two main services provided by a nutrition expert, performing them in a human-like manner: i) patient health state assessment ii) meal plan generation. Preliminary results based on 16 real-world human test subjects highlight the solution's effectiveness and efficiency.

[4] The current project aims to create a platform for intelligent meal planning for users based on their clinical conditions. The use of machine learning algorithms in nutrition, healthcare services, and continuous care is thus an important area of study. This platform will be tested and implemented at Vila Verde's Social Cafeteria (Cantina Social da Santa Casa da Misericórdia de Vila Verde). The Design Science Research (DSR) investigation methodology will be used in the development of this project,

ensuring that the solution to the problem meets all needs and requirements of the professionals while elucidating new knowledge for both the institution and the scientific community.

[5] Learning users' food preferences and delivering food recommendations that appeal to their taste while also meeting nutritional guidelines are difficult tasks. Due to a lack of access to a proper meal planning application or the lack of professional assistance, most users follow ineffective, generic meal plans that impede their fitness goals and frequently cause long-term and short-term health complications. The proposed implementation aims to bridge the gap between current meal planning apps and the potential need for a personalized healthy meal plan. This paper presents the design and implementation of the proposed personalized and healthy meal recommendation system, as well as the architecture and evaluation of the design solution, in a concise manner.

[6] In response to this public health issue, the Virtual Dietitian (VD) nutrition system was created. Healthcare professionals provided feedback on the accuracy of processes and meal plan generation, while information technology experts highlighted VD's technical shortcomings (e.g., web standards, layout, and design, functionality, navigation, usability). This beta evaluation provided an overview of the true experience gained by end users while using VD without the hassle of going through the entire project lifecycle. Expert feedback, which will be used in the next phase, was beneficial in ensuring that the final version of VD is correct, useful, and valid.

[7] In contrast to previous works, this paper presents a general framework for daily meal plan recommendations, with the main feature of simultaneous management of nutritional-aware and preference-aware information. The proposal includes a pre-filtering stage that employs AHPSort as a multi-criteria decision analysis tool to eliminate foods that are unsuitable for the current user characteristics. It also includes an optimization-based stage for generating a daily meal plan, with the goal of recommending food that is highly preferred by the user, has not been consumed recently, and meets his/her daily nutritional requirements.

The proposed framework in this system analyses blood through a Photoplethysmography (PPG), which is an interesting and reasonable non-invasive sensor, and sends the data to a prepared ML model, which checks for any anomalies in the heart rate and blood analyses and recommends the eating regimen and assists them with maintaining their sustenance. Diagnosing any medical issue requires a complete diet and nutritional history of the particular person, which is time-consuming and costly. The eating habits and nourishment of newborn children and older people are delicate and should be handled with more care and caution. So, the researchers developed a system in which one can continuously monitor their sustenance and well-being with no invasive techniques on their body.

[8] Nutrition is a critical component of human body development. Poor nutrition can lead to decreased immunity, increased vulnerability to various diseases, and impaired physical and mental development. Good nutrition is essential for overall health. One of the facts that an individual must be aware of for its own nutrition requirement is the current scenario. It is relatively simple to improve nutrition with technological advancements such as machine learning and allied computing. An attempt was made in this article to summaries the comprehensive nutrition profile in order to develop a recommendation system using machine learning algorithms.

[9] Nutrigenomics represents a better understanding of how genomics is linked to the development of personalized nutritional science, and it represents a promising approach to designing customized nutritional solutions for individuals or population sub-groups. In this paper, Jitao Yang designed and implemented a mobile professional personalized nutrition recommendation platform that enables the application of new nutrigenomics findings at the population sub-group and even individual levels.

2.1 INFERENCES FROM LITERATURE SURVEY

From the above mentioned literature works, it is clear that there has been effective research on personal nutritionist and diet recommendation system and many models have been proposed.

It is evident that the above-mentioned systems have their own pros and cons. While some of the recent works involve hybrid technologies and provide better accuracies, they are still far from what is needed.

With higher accuracy, comes the need for low computational costs, high processing speed, and most of all, convenience of use.

2.2 OPEN PROBLEMS IN EXISTING SYSTEM

The existing system is based on content based recommendation systems. Content based food recommender system is where recommend food recipes according to the preferences already given by the user. The preferred recipes of the user are fragmented into ingredients which are assigned ratings according to the stored users' preferences. The recipes with the matching ingredient are recommended. The traditional models do not consider the nutrition factors and the balance in the diet. Nutrition factors are ignored which are very much important to recommend food and balance diet. Only foods containing milk or fish can be searched. Only displays the nutritional value of the food. Does not contain a wide variety of food but only the popular ones. For the existing system of personalized diet recommendation system, a small dataset is taken and only one or two features such as weight loss is taken into consideration. The system shows low accuracy and high processing time.

CHAPTER 3
SYSTEM ANALYSIS

3.1 EXISTING SYSTEM

The existing system is based on content based recommendation systems. Content based food recommender system is where recommend food recipes according to the preferences already given by the user. The preferred recipes of the user are fragmented into ingredients which are assigned ratings according to the stored users' preferences. The recipes with the matching ingredient are recommended. The traditional models do not consider the nutrition factors and the balance in the diet. Nutrition factors are ignored which are very much important to recommend food and balance diet. Only foods containing milk or fish can be searched. Only displays the nutritional value of the food. Does not contain a wide variety of food but only the popular ones. For the existing system of personalized diet recommendation system, a small dataset is taken and only one or two features such as weight loss is taken into consideration. The system shows low accuracy and high processing time.

3.2 PROPOSED SYSTEM

This project aims to present the development of an expert system prototype on nutrition and diet domain. The objective of this developed nutrition and diet expert system is to help people to evaluate their nutrition condition and to know their neediness of the type of food and required time to do exercising each day. Moreover, the system provides advices about healthy food and the rate of protein, vitamins, and calcium they have to eat. Accordingly the developed system improves people awareness about the importance of nutrition, reduces consultation time and makes people care more about their health. This developed prototype nutrition expert system provides advice only for healthy people , not for unhealthy people and pregnant and lactating women. The major advantage of the proposed system for personalized nutritionist based system is that it is highly accurate, and precise. For the proposed system, large vast dataset is taken. Features like weight gain are

added in proposed system with improved accuracy. The system can be used in situations where large amounts of data have to be processed in a short amount of time. It is cost-efficient.

3.3 FEASIBILITY STUDY

With an eye towards gauging the project's viability and improving server performance, a business proposal defining the project's primary goals and offering some preliminary cost estimates is offered here. Your proposed system's viability may be assessed once a comprehensive study has been performed. It is essential to have a thorough understanding of the core requirements of the system at hand before beginning the feasibility study. The feasibility research includes mostly three lines of thought:

- Economical feasibility
- Technical feasibility
- Operational feasibility
- Social feasibility

3.3.1 ECONOMICAL FEASIBILITY

The study's findings might help upper management estimate the potential cost savings from using this technology. The corporation can only devote so much resources to developing and analysing the system before running out of money. Every dollar spent must have a valid reason. As the bulk of the used technologies are open-source and free, the cost of the updated infrastructure came in far cheaper than anticipated. It was really crucial to only buy customizable products.

3.3.2 TECHNICAL FEASIBILITY

This research aims to establish the system's technical feasibility to ensure its smooth

development. Adding additional systems shouldn't put too much pressure on the IT staff. Hence, the buyer will experience unnecessary anxiety. Due to the low likelihood of any adjustments being necessary during installation, it is critical that the system be as simple as possible in its design.

3.3.3 OPERATIONAL FEASIBILITY

An important aspect of our research is hearing from people who have actually used this technology. The procedure includes instructing the user on how to make optimal use of the resource at hand. The user shouldn't feel threatened by the system, but should instead see it as a necessary evil. Training and orienting new users has a direct impact on how quickly they adopt a system. Users need to have greater faith in the system before they can submit constructive feedback.

3.3.4 SOCIAL FEASIBILITY

During the social feasibility analysis, we look at how the project could change the community. This is done to gauge the level of public interest in the endeavour. Because of established cultural norms and institutional frameworks, it's likely that a certain kind of worker will be in low supply or nonexistent.

3.4 REQUIREMENT SPECIFICATION

3.4.1 HARDWARE REQUIREMENTS

Processor	: Pentium Dual Core 2.00GHZ
Hard disk	: 120 GB
RAM	: 2GB (minimum)
Keyboard	: 110 keys enhanced

3.4.2 SOFTWARE REQUIREMENTS

Operating system	: Windows7 (with service pack 1), 8, 8.1 and 10

IDE : Anaconda

Language : Python

3.5 LANGUAGE SPECIFICATION

Anaconda is an open-source package manager for Python and R. It is the most popular platform among data science professionals for running Python and R implementations. There are over 300 libraries in data science, so having a robust distribution system for them is a must for any professional in this field.Anaconda simplifies package deployment and management. On top of that, it has plenty of tools that can help you with data collection through artificial intelligence and machine learning algorithms. With Anaconda, you can easily set up, manage, and share Conda environments. Moreover, you can deploy any required project with a few clicks when you're using Anaconda.There are many advantages to using Anaconda and the following are the most prominent ones among them:Anaconda is free and open-source. This means you can use it without spending any money. In the data science sector, Anaconda is an industry staple. It is open-source too, which has made it widely popular. If you want to become a data science professional, you must know how to use Anaconda for Python because every recruiter expects you to have this skill. It is a must-have for data science.

It has more than 1500 Python and R data science packages, so you don't face any compatibility issues while collaborating with others. For example, suppose your colleague sends you a project which requires packages called A and B but you only have package A. Without having package B, you wouldn't be able to run the project. Anaconda mitigates the chances of such errors. You can easily collaborate on projects without worrying about any compatibility issues.It gives you a seamless environment that simplifies deploying projects. You can deploy any project with just a few clicks and commands while managing the rest. Anaconda has a thriving community of data scientists and machine learning professionals who use it regularly. If you encounter an issue, chances are, the community has already answered the same. On the other hand, you can also ask people in the community about the issues you face there, it's a very helpful community ready to help new learners. With Anaconda, you can easily create and train machine learning and deep learning models as it works well with popular tools including TensorFlow, Scikit-

Learn, and Theano. You can create visualizations by using Bokeh, Holoviews, Matplotlib, and Datashader while using Anaconda.

How to Use Anaconda for Python

Now that we have discussed all the basics in our Python Anaconda tutorial, let's discuss some fundamental commands you can use to start using this package manager.

Listing All Environments

To begin using Anaconda, you'd need to see how many Conda environments are present in your machine.

conda env list

It will list all the available Conda environments in your machine.

Creating a New Environment

You can create a new Conda environment by going to the required directory and use this command:

conda create -n <your_environment_name>

You can replace <your_environment_name> with the name of your environment. After entering this command, conda will ask you if you want to proceed to which you should reply with y:

proceed ([y])/n)?

On the other hand, if you want to create an environment with a particular version of Python, you should use the following command:

conda create -n <your_environment_name> python=3.6

Similarly, if you want to create an environment with a particular package, you can use the following command:

conda create -n <your_environment_name>pack_name

Here, you can replace pack_name with the name of the package you want to use.

If you have a .yml file, you can use the following command to create a new Conda environment based on that file:

conda env create -n <your_environment_name> -f <file_name>.yml

We have also discussed how you can export an existing Conda environment to a .yml file later in this article.

Activating an Environment

You can activate a Conda environment by using the following command:

conda activate <environment_name>

You should activate the environment before you start working on the same. Also, replace the term <environment_name> with the environment name you want to activate. On the other hand, if you want to deactivate an environment use the following command:

conda deactivate

Installing Packages in an Environment

Now that you have an activated environment, you can install packages into it by using the following command:

conda install <pack_name>

Replace the term <pack_name> with the name of the package you want to install in your Conda environment while using this command.

Updating Packages in an Environment

If you want to update the packages present in a particular Conda environment, you should use the following command:

conda update

The above command will update all the packages present in the environment. However, if you want to update a package to a certain version, you will need to use the following command:

conda install <package_name>=<version>

Exporting an Environment Configuration

Suppose you want to share your project with someone else (colleague, friend, etc.). While you can share the directory on Github, it would have many Python packages, making the transfer process very challenging. Instead of that, you can create an environment configuration .yml file and share it with that person. Now, they can create an environment like your one by using the .yml file.

For exporting the environment to the .yml file, you'll first have to activate the same and run the following command:

conda env export ><file_name>.yml

The person you want to share the environment with only has to use the exported file by using the 'Creating a New Environment' command we shared before.

Removing a Package from an Environment

If you want to uninstall a package from a specific Conda environment, use the following command:

conda remove -n <env_name><package_name>

On the other hand, if you want to uninstall a package from an activated environment, you'd have to use the following command:

conda remove <package_name>

Deleting an Environment

Sometimes, you don't need to add a new environment but remove one. In such cases, you must know how to delete a Conda environment, which you can do so by using the following command:

conda env remove –name <env_name>

The above command would delete the Conda environment right away.

CHAPTER 4

SYSTEM DESIGN

4.1 SYSTEM ARCHITECTURE

This diagram is nothing but a simple description of all the entities that have been incorporated into the system. The diagram represents the relations between each of them and involves a sequence of decision-making processes and steps. You can simply call it a visual or the whole process and its implementation. All functional correspondences are explained in this diagram.

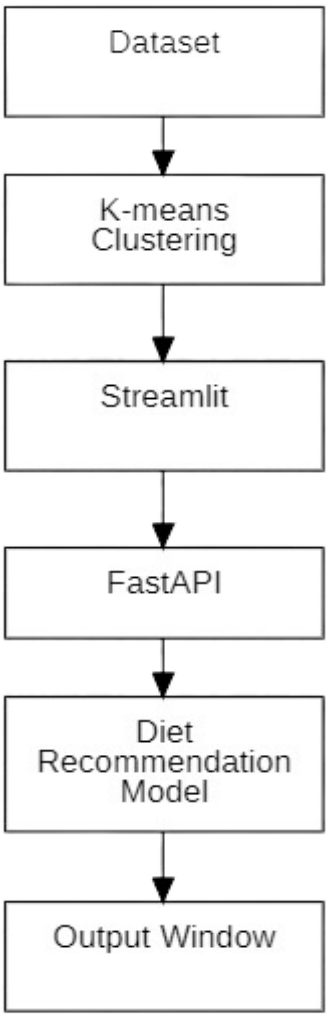


FIG 4.1 – Architecture Diagram

4.2 USE-CASE DIAGRAM

A use case diagram is a standard diagram that shows all interactions between the user, dataset, and algorithm used. It is developed in the early stages of the process

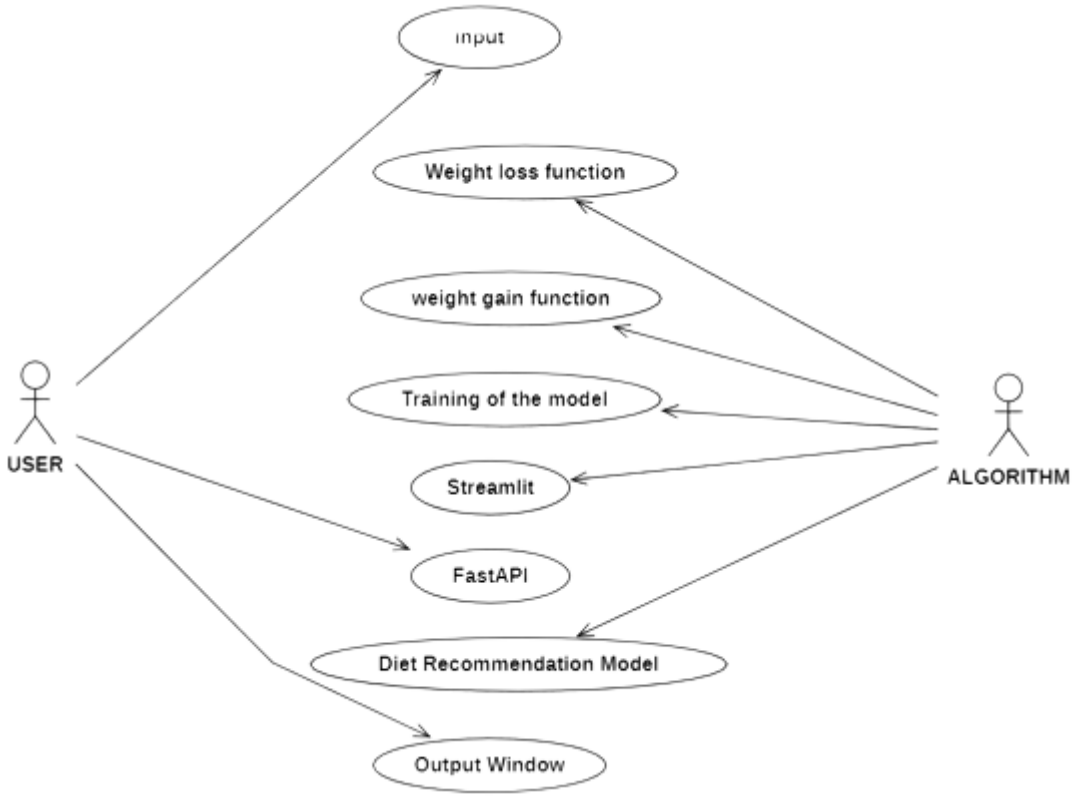


FIG 4.2 – Use -Case Diagram

4.3 DATA FLOW DIAGRAM

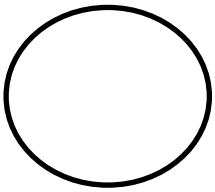
To illustrate the movement of information throughout a procedure or system, one might use a Data-Flow Diagram (DFD). A data-flow diagram does not include any decision rules or loops, as the flow of information is entirely one-way. A flowchart can be used to illustrate the steps used to accomplish a certain data-driven task. Several different notations exist for representing data-flow graphs. Each data flow must have a process that acts as either the source or the target of the information exchange. Rather than utilizing a data-flow diagram, users of UML often substitute an activity diagram. In the realm of data-flow plans, site-oriented data-flow plans are a subset. Identical nodes in a data-flow diagram and a Petri net can be thought of as inverted counterparts since the semantics of data memory are represented by the locations in the network. Structured data modeling (DFM) includes processes, flows, storage, and

terminators.

Data Flow Diagram Symbols

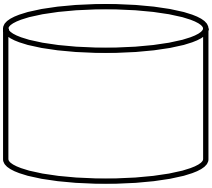
Process

A process is one that takes in data as input and returns results as output.



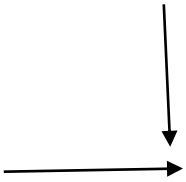
Data Store

In the context of a computer system, the term "data stores" is used to describe the various memory regions where data can be found. In other cases, "files" might stand in for data.



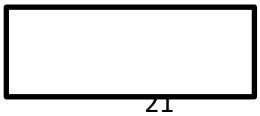
Data Flow

Data flows are the pathways that information takes to get from one place to another. Please describe the nature of the data being conveyed by each arrow.



External Entity

In this context, "external entity" refers to anything outside the system with which the system has some kind of interaction. These are the starting and finishing positions for inputs and outputs, respectively.



DATA FLOW DIAGRAM

The whole system is shown as a single process in a level DFD. Each step in the system's assembly process, including all intermediate steps, are recorded here. The "basic system model" consists of this and 2-level data flow diagrams.

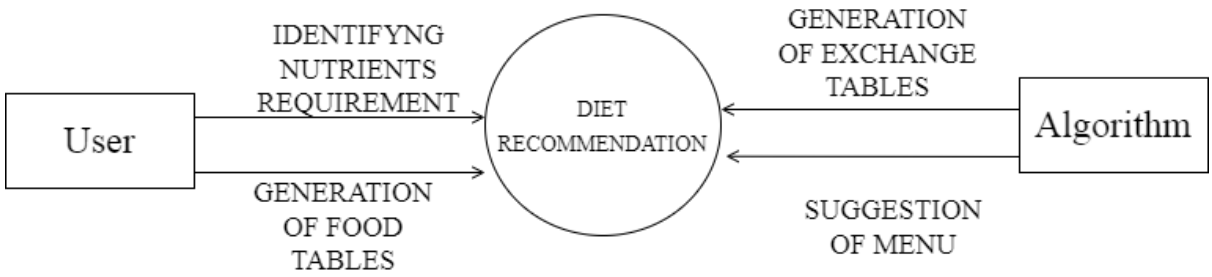


Fig 4.3 – Data Flow Diagram

4.4 ACTIVITY DIAGRAM

In simple terms, a diagram that represents the order of all activities is called the activity diagram. It shows the workflow between different activities that take place in the whole process. However, these are not exactly flowcharts but are similar.

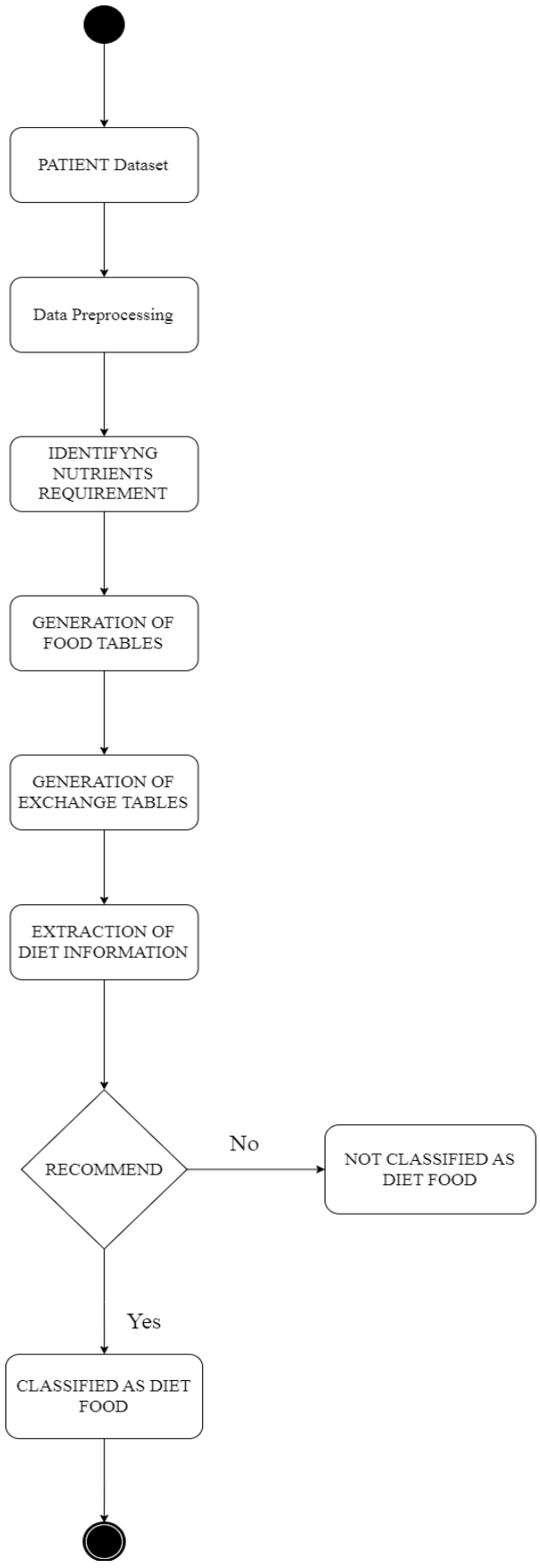


Fig 4.4- Activity Diagram

4.5 SEQUENCE DIAGRAM

These are another type of interaction-based diagram used to display the workings of the system. They record the conditions under which objects and processes cooperate.

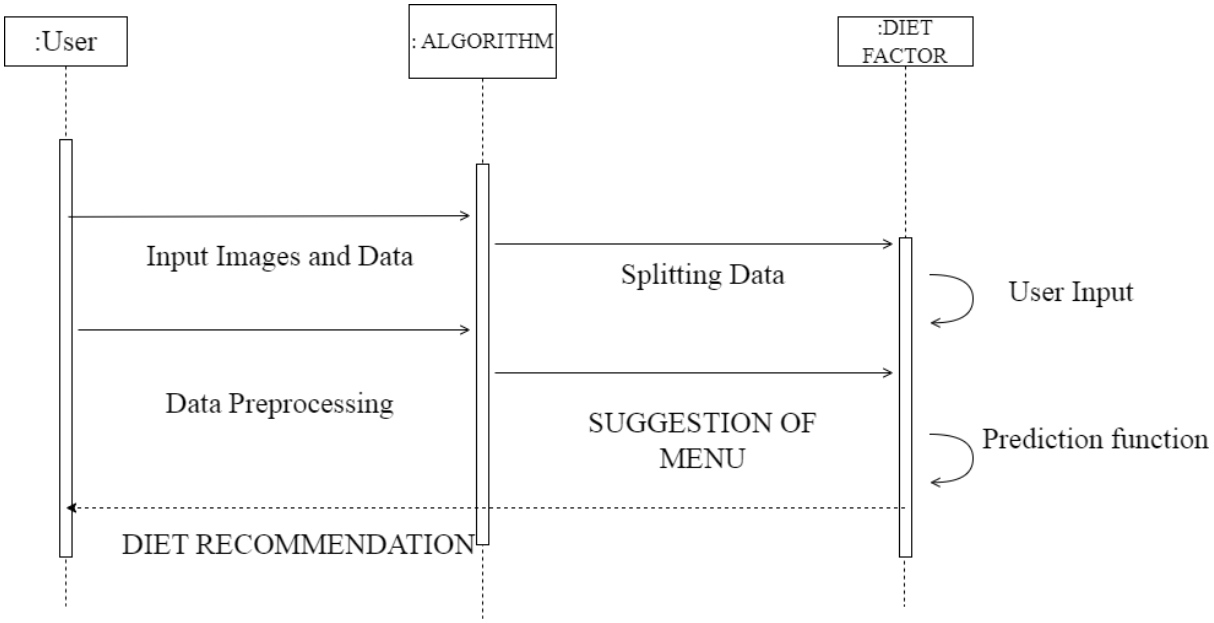


Fig 4.5 – Sequence Diagram

CHAPTER 5
MODULE DESCRIPTION

5.1 MODULE 1: DATA COLLECTION AND PRE-PROCESSING

Data collection and pre-processing is a critical step in any machine learning project. The quality and accuracy of the input data can greatly impact the effectiveness of the algorithms used in the later stages of the project. In this module, we will focus on collecting and pre-processing the input data for the recommended food items project.

Data Collection:

The first step in this module is to collect the input data required for the project. In this case, the input data includes age, weight, height, dietary preference (veg or non-veg), and any ailments the user may have. The data can be collected through various methods such as surveys, user input, or medical records.

The collected data should be verified for accuracy and completeness before it is used in the subsequent modules. Any missing or erroneous data should be handled appropriately to avoid potential issues during the analysis stage.

Data Cleaning:

Once the input data has been collected, it is important to clean the data to remove any errors or inconsistencies. Data cleaning involves a range of techniques and processes that ensure the data is accurate, complete, and consistent.

One of the primary tasks in data cleaning is removing any missing or incomplete data. Missing data can lead to inaccurate analysis and results, and can also impact the performance of machine learning algorithms. Various methods such as imputation or deletion can be used to handle missing data.

Another important aspect of data cleaning is dealing with outliers or errors in the data. Outliers are data points that fall outside the normal range of the data and can have a significant impact on the analysis. Outliers can be handled by removing them or by

using more advanced statistical techniques such as transformations.

Data Pre-processing:

After the data has been cleaned, the next step is to pre-process the data. Pre-processing involves various techniques and processes that ensure the data is ready for analysis by the machine learning algorithms.

One of the primary tasks in data pre-processing is feature extraction. Feature extraction involves selecting the most relevant features from the input data that will be used in the analysis. In this case, the relevant features include age, weight, height, dietary preference, and any ailments.

Another important aspect of data pre-processing is data normalization. Data normalization involves scaling the data to a common range to ensure that all features have equal importance in the analysis. Normalization can help improve the accuracy and performance of machine learning algorithms.

Data visualization is also an important aspect of data pre-processing. Visualization can help identify patterns or relationships in the data that may not be immediately apparent. Visualization can also help identify outliers or errors that may have been missed during the cleaning stage.

In summary, Module 1 involves collecting and pre-processing the input data for the recommended food items project. This module includes data collection, data cleaning, and data pre-processing. The quality and accuracy of the input data is critical to the success of the project, and the techniques used in this module ensure that the data is ready for analysis by the machine learning algorithms in the subsequent modules.

5.2 MODULE 2: ALGORITHM BUILDING AND TRAINING USING K-MEANS CLUSTERING AND RANDOM FOREST CLASSIFIER

Once the input data has been collected and pre-processed in Module 1, the next step is to build and train the machine learning algorithms that will be used to recommend

food items based on the user's input. In this module, we will focus on building and training two algorithms: K-means clustering and Random Forest Classifier.

K-means Clustering:

K-means clustering is a popular unsupervised machine learning algorithm that is used to group data points based on their similarities. In this project, we will use K-means clustering to group the food items based on their nutritional content and other relevant features.

The first step in using K-means clustering is to determine the number of clusters that should be used. This can be determined through various methods such as the elbow method or the silhouette method. Once the number of clusters has been determined, the algorithm is trained on the pre-processed input data.

During training, the K-means algorithm groups the food items into clusters based on their similarities. Each cluster represents a group of food items that have similar nutritional content and other relevant features. The user's input data is then used to identify the cluster that best matches their requirements. The food items in that cluster are then recommended to the user as suitable options.

Random Forest Classifier:

Random Forest Classifier is a popular supervised machine learning algorithm that is used to classify data into different categories. In this project, we will use Random Forest Classifier to classify the food items based on their nutritional content and other relevant features.

The first step in using Random Forest Classifier is to split the input data into training and testing sets. The training set is used to train the algorithm, while the testing set is used to evaluate the performance of the algorithm.

During training, the Random Forest Classifier algorithm uses the pre-processed input data to build a decision tree. The decision tree is then used to classify the food items into different categories based on their nutritional content and other relevant features.

Once the algorithm has been trained, the user's input data is used to classify the food items into different categories. The food items in the category that best matches the user's requirements are then recommended to the user as suitable options.

In summary, Module 2 involves building and training two machine learning algorithms: K-means clustering and Random Forest Classifier. K-means clustering is used to group the food items based on their nutritional content and other relevant features, while Random Forest Classifier is used to classify the food items into different categories. These algorithms are trained on the pre-processed input data from Module 1 and are used to recommend food items to the user in Module 3. The accuracy and performance of the algorithms are critical to the success of the project, and the techniques used in this module ensure that the algorithms are trained to provide the best possible results.

5.3 MODULE 3: RECOMMENDED FOOD ITEMS

In Module 3, the trained algorithms from Module 2 are used to recommend food items to the user based on their input data. The output of this module is a list of recommended food items that are suitable for the user's age, weight, height, dietary preferences, and any existing ailments.

The first step in this module is to process the user's input data using the K-means clustering and Random Forest Classifier algorithms that were trained in Module 2. The K-means clustering algorithm groups the food items into clusters based on their nutritional content and other relevant features, while the Random Forest Classifier classifies the food items into different categories.

Once the input data has been processed, the algorithm identifies the cluster or category that best matches the user's requirements. The food items in that cluster or category are then recommended to the user as suitable options.

For example, if the user has specified that they are vegetarian, the algorithm will recommend food items that are suitable for vegetarians. Similarly, if the user has specified that they have high blood pressure, the algorithm will recommend food

items that are low in sodium and suitable for people with high blood pressure.

The recommended food items are displayed to the user in a user-friendly format, such as a list or a table. The recommended food items may include details such as their nutritional content, calorie count, and serving size. This information can help the user make informed decisions about their diet and ensure that they are consuming a balanced and healthy diet.

The accuracy and reliability of the recommended food items depend on the quality of the input data and the performance of the machine learning algorithms. Therefore, it is important to ensure that the input data is accurate and that the algorithms are trained using a diverse and representative dataset.

In addition to recommending food items, this module can also be used to track the user's diet and provide feedback on their nutritional intake. This feedback can help the user make better dietary choices and achieve their health and fitness goals.

Overall, Module 3 provides a valuable tool for recommending food items that are tailored to the user's age, weight, height, dietary preferences, and any existing ailments. The use of machine learning algorithms ensures that the recommended food items are accurate and reliable, and the user-friendly format makes it easy for the user to make informed decisions about their diet.

5.4 SYSTEM TESTING

TESTING METHODOLOGIES

The following are the Testing Methodologies

- **Unit Testing.**
- **Integration Testing.**
- **User Acceptance Testing.**
- **Output Testing.**
- **Validation Testing.**

Unit Testing

Unit testing focuses verification effort on the smallest unit of Software design that is the module. Unit testing exercises specific paths in a module's control structure to

ensure complete coverage and maximum error detection. This test focuses on each module individually, ensuring that it functions properly as a unit. Hence, the naming is Unit Testing.

During this testing, each module is tested individually and the module interfaces are verified for the consistency with design specification. All important processing path are tested for the expected results. All error handling paths are also tested.

Integration Testing

Integration testing addresses the issues associated with the dual problems of verification and program construction. After the software has been integrated a set of high order tests are conducted. The main objective in this testing process is to take unit tested modules and builds a program structure that has been dictated by design.

The following are the types of Integration Testing:

1. Top Down Integration

This method is an incremental approach to the construction of program structure. Modules are integrated by moving downward through the control hierarchy, beginning with the main program module. The module subordinates to the main program module are incorporated into the structure in either a depth first or breadth first manner.

In this method, the software is tested from main module and individual stubs are replaced when the test proceeds downwards.

2. Bottom-up Integration

This method begins the construction and testing with the modules at the lowest level in the program structure. Since the modules are integrated from the bottom up, processing required for modules subordinate to a given level is always available and the need for stubs is eliminated. The bottom up integration strategy may be implemented with the following steps:

- The low-level modules are combined into clusters into clusters that perform a specific Software sub-function.
- A driver (i.e.) the control program for testing is written to coordinate test case input and output.
- The cluster is tested.
- Drivers are removed and clusters are combined moving upward in the program structure

The bottom up approaches tests each module individually and then each module is module is integrated with a main module and tested for functionality.

User Acceptance Testing

User Acceptance of a system is the key factor for the success of any system. The system under consideration is tested for user acceptance by constantly keeping in touch with the prospective system users at the time of developing and making changes wherever required. The system developed provides a friendly user interface that can easily be understood even by a person who is new to the system.

Output Testing

After performing the validation testing, the next step is output testing of the proposed system, since no system could be useful if it does not produce the required output in the specified format. Asking the users about the format required by them tests the outputs generated or displayed by the system under consideration. Hence the output format is considered in 2 ways – one is on screen and another in printed format.

Validation Checking

Validation checks are performed on the following fields.

Text Field:

The text field can contain only the number of characters lesser than or equal to its size. The text fields are alphanumeric in some tables and alphabetic in other tables. Incorrect entry always flashes and error message.

Numeric Field:

The numeric field can contain only numbers from 0 to 9. An entry of any character flashes an error messages. The individual modules are checked for accuracy and what it has to perform. Each module is subjected to test run along with sample data. The individually tested modules are integrated into a single system. Testing involves executing the real data information is used in the program the existence of any program defect is inferred from the output. The testing should be planned so that all the requirements are individually tested.

A successful test is one that gives out the defects for the inappropriate data and produces and output revealing the errors in the system.

Preparation of Test Data

Taking various kinds of test data does the above testing. Preparation of test data plays a vital role in the system testing. After preparing the test data the system under study is tested using that test data. While testing the system by using test data errors

are again uncovered and corrected by using above testing steps and corrections are also noted for future use.

Using Live Test Data:

Live test data are those that are actually extracted from organization files. After a system is partially constructed, programmers or analysts often ask users to key in a set of data from their normal activities. Then, the systems person uses this data as a way to partially test the system. In other instances, programmers or analysts extract a set of live data from the files and have them entered themselves.

It is difficult to obtain live data in sufficient amounts to conduct extensive testing. And, although it is realistic data that will show how the system will perform for the typical processing requirement, assuming that the live data entered are in fact typical, such data generally will not test all combinations or formats that can enter the system. This bias toward typical values then does not provide a true systems test and in fact ignores the cases most likely to cause system failure.

Using Artificial Test Data:

Artificial test data are created solely for test purposes, since they can be generated to test all combinations of formats and values. In other words, the artificial data, which can quickly be prepared by a data generating utility program in the information systems department, make possible the testing of all login and control paths through the program.

The most effective test programs use artificial test data generated by persons other than those who wrote the programs. Often, an independent team of testers formulates a testing plan, using the systems specifications.

The package “Virtual Private Network” has satisfied all the requirements specified as

per software requirement specification and was accepted.

USER TRAINING

Whenever a new system is developed, user training is required to educate them about the working of the system so that it can be put to efficient use by those for whom the system has been primarily designed. For this purpose the normal working of the project was demonstrated to the prospective users. Its working is easily understandable and since the expected users are people who have good knowledge of computers, the use of this system is very easy.

MAINTAINENCE

This covers a wide range of activities including correcting code and design errors. To reduce the need for maintenance in the long run, we have more accurately defined the user's requirements during the process of system development. Depending on the requirements, this system has been developed to satisfy the needs to the largest possible extent. With development in technology, it may be possible to add many more features based on the requirements in future. The coding and designing is simple and easy to understand which will make maintenance easier.

TESTING STRATEGY:

A strategy for system testing integrates system test cases and design techniques into a well planned series of steps that results in the successful construction of software. The testing strategy must co-operate test planning, test case design, test execution, and the resultant data collection and evaluation .A strategy for software testing must accommodate low-level tests that are necessary to verify that a small source code segment has been correctly implemented as well as high level tests that validate major system functions against user requirements.

Software testing is a critical element of software quality assurance and represents the ultimate review of specification design and coding. Testing represents an interesting anomaly for the software. Thus, a series of testing are performed for the proposed system before the system is ready for user acceptance testing.

SYSTEM TESTING:

Software once validated must be combined with other system elements (e.g. Hardware, people, database). System testing verifies that all the elements are proper and that overall system function performance is
achieved. It also tests to find discrepancies between the system and its original objective, current specifications and system documentation.

UNIT TESTING:

In unit testing different are modules are tested against the specifications produced during the design for the modules. Unit testing is essential for verification of the code produced during the coding phase, and hence the goals to test the internal logic of the modules. Using the detailed design description as a guide, important Conrail paths are tested to uncover errors within the boundary of the modules. This testing is carried out during the programming stage itself. In this type of testing step, each module was found to be working satisfactorily as regards to the expected output from the module.

CHAPTER 6
RESULTS AND DISCUSSION

By utilizing machine learning algorithms, your system can generate personalized nutrition recommendations that are tailored to each user's unique characteristics. This has the potential to improve the overall health outcomes of users by providing them with customized dietary guidelines that are more effective and sustainable compared to generic recommendations.

Our system can help users better understand their nutritional needs and educate them on healthy eating habits. This can be achieved through providing users with feedback and recommendations based on their dietary habits and tracking their progress towards their goals. By doing so, users can become more aware of their dietary habits and make informed decisions about what they eat.

Our system can also aid in disease prevention and management. By taking into account a user's health information, your system can recommend foods and diets that can help manage or prevent chronic diseases such as diabetes, hypertension, and cardiovascular diseases.

Overall, your project has the potential to contribute to the field of nutrition and health by providing users with personalized nutrition recommendations based on their health information. This can lead to better health outcomes and promote healthy eating habits. However, it is important to keep in mind that machine learning algorithms are not perfect and can be influenced by biases and limitations in the data used to train them. Therefore, it is important to thoroughly evaluate and validate the results of your system before it is deployed for real-world use.

CHAPTER 7
CONCLUSION

7.1 CONCLUSION

In conclusion, the Personal nutritionist Diet Recommendation System using Machine Learning is a promising technology that has the potential to revolutionize the way we approach our dietary needs. By leveraging the power of artificial intelligence algorithms, this system can provide personalized and accurate dietary recommendations based on individual needs, preferences, and health conditions. The system is highly beneficial for users who are looking to achieve their health goals in a more efficient and effective way. It can help users track their dietary patterns, identify areas of improvement, and suggest ways to modify their diet to meet their needs. Moreover, the Personal nutritionist Diet Recommendation System using Machine Learning can adapt to individual changes in the user's lifestyle, health status, or dietary habits, making it highly customizable and scalable. As the field of machine learning continues to evolve, we can expect to see more advanced and sophisticated systems that can provide even more accurate and personalized dietary recommendations. These systems have the potential to revolutionize the way we approach our dietary needs and help us achieve our health goals more effectively. Overall, the Personal nutritionist Diet Recommendation System using Machine Learning is an innovative solution that has the potential to improve the health and well-being of millions of people worldwide.

7.2 FUTURE WORK

It has immense potential for future development and improvements.

Some of the future work that can be considered are:

- Incorporating more health parameters: Currently, the system considers only a few parameters such as weight, height, age, sex, and physical activity. In the future, more health parameters such as medical history, dietary restrictions, and genetic information can be included to make the diet recommendation more personalized and accurate.
- Real-time updates: The system can be further developed to provide real-time updates on the user's progress and health status. This will help the system to adjust the diet recommendations based on the user's changing health condition.

- Integration with wearables: With the increasing popularity of wearables such as fitness trackers and smartwatches, the system can be integrated with these devices to provide real-time data on the user's physical activity, sleep pattern, heart rate, and other health-related metrics. This will help the system to provide more accurate and personalized diet recommendations.

- Nutrient analysis: The system can be further developed to provide detailed nutrient analysis of the recommended diet plan. This will help the user to understand the nutritional value of the recommended foods and ensure that they are meeting their daily nutrient requirements.

- User feedback and reviews: The system can be enhanced with a feedback and review system where users can provide feedback on the recommended diet plan. This will help to improve the system's accuracy and effectiveness over time.

- Gamification: The system can be gamified to make the diet recommendation process more engaging and motivating for users. This can include rewards and challenges based on the user's progress towards their health goals.

In conclusion, the "Personal nutritionist Diet recommendation system based on user health information" project has enormous potential for future development and improvements. By incorporating more health parameters, providing real-time

updates, integrating with wearables, nutrient analysis, user feedback and reviews, and gamification, the system can be made more personalized, accurate, engaging, and effective.

7.3 RESEARCH ISSUES

The project has several research issues that need to be addressed to ensure the accuracy, effectiveness, and safety of the system.
Some of the research issues that need to be considered are:

- Data quality: The accuracy and reliability of the system depend on the quality of the dataset used to develop the diet chart. It is essential to ensure that the dataset is comprehensive, up-to-date, and represents a diverse population.

- Personalization: To provide accurate diet recommendations, the system needs to be personalized based on the user's health information, medical history, allergies, and dietary restrictions. Research is needed to develop algorithms and models that can accurately personalize the diet recommendations based on user data.

- Nutritional balance: The diet recommendations should be nutritionally balanced to ensure that the user is meeting their daily nutrient requirements. Research is needed to develop algorithms that can optimize the nutrient balance of the recommended diet plans while accounting for individual health parameters.

- Safety: The system needs to ensure that the recommended diet plan is safe and does not cause any adverse health effects. Research is needed to identify potential risks and develop strategies to mitigate them.

- Effectiveness: The effectiveness of the system depends on how well the users

adhere to the recommended diet plan. Research is needed to identify the factors that influence user adherence and develop strategies to improve adherence rates.

- User experience: The success of the system depends on how well it is accepted and adopted by the users. Research is needed to identify the factors that influence user satisfaction and develop strategies to improve the user experience.

In conclusion, the "Personal nutritionist Diet recommendation system based on user health information" project has several research issues that need to be addressed to ensure the accuracy, effectiveness, and safety of the system. These include data quality, personalization, nutritional balance, safety, effectiveness, and user experience. Addressing these issues will be crucial in developing a successful and widely adopted diet recommendation system.

7.4 IMPLEMENTATION ISSUES

The implementation of the project has several issues that need to be considered to ensure its successful implementation and operation.
Some of the implementation issues that need to be addressed are:

- Data security and privacy: The system will handle sensitive personal health information of the users, and it is essential to ensure the confidentiality, integrity, and availability of this data. Adequate measures must be taken to secure the data, such as using encryption, access controls, and data backups.

- Scalability: The system should be scalable to handle a growing number of users and data. The system should be designed to handle large amounts of data, traffic, and requests efficiently.

- User interface: The user interface of the system should be easy to use, intuitive, and visually appealing. The interface should be designed to provide relevant information and feedback to the users and facilitate easy navigation.

- Integration with other systems: The system should be integrated with other systems such as wearables, electronic health records, and other health-related apps. This will provide a more comprehensive and personalized health management solution for the users.

- Maintenance and updates: The system should be regularly maintained and updated to ensure its optimal performance and security. The system should be designed to facilitate easy updates and maintenance without disrupting the system's operation.

- Regulatory compliance: The system should comply with the relevant health and privacy regulations, such as the Health Insurance Portability and Accountability Act (HIPAA) and General Data Protection Regulation (GDPR).

In conclusion, the implementation of the "Personal nutritionist Diet recommendation system based on user health information" project has several issues that need to be considered to ensure its successful implementation and operation. These include data security and privacy, scalability, user interface, integration with other systems, maintenance and updates, and regulatory compliance. Addressing these issues will be crucial in developing a successful and sustainable diet recommendation system.

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APPENDIX

A. SOURCE CODE

```
<!DOCTYPE html>
<html>
<head>
	<title>{{title}}</title>
	<link rel="stylesheet" type="text/css" href="{{url_for('static',filename = 'styles.css') }}">
	<link rel="stylesheet" media="screen" href ="{{url_for('static',filename = 'bootstrap.min.css') }}">
	<link rel="stylesheet" href="static/bootstrap-theme.min.css">
	<meta name="viewport" content = "width=device-width, initial-scale=1.0">
</head>
<body>
	<div class="container">
		{% block main %}
			<h1><center>Personal Nutritionist Diet Recommendation</center></h2>
			<h3><center>Get your personalised Diet Chart!</center></h3>
			<form  action="" method="post" role="form" class="my-form">
				{{ form.hidden_tag()}}
				<div class="form-group">
					{{form.name.label(class="form-control-label")}}

					{%if form.name.errors%}
						{{form.name(class="form-control form-control-md is-invalid")}}
						<div class="invalid-feedback">
							{%for error in form.name.errors%}
								<span>{{error}}</span>
							{%endfor%}
						</div>
					{%else%}
						{{form.name(class="form-control form-control-md")}}
					{%endif%}
				</div>
				<div class="form-group">
```

```
                {{form.weight.label(class="form-control-label")}}

                {%if form.weight.errors%}
                    {{form.weight(class="form-control form-
control-md is-invalid")}}
                    <div class="invalid-feedback">
                        {%for error in form.weight.errors%}
                            <span>{{error}}</span>
                        {%endfor%}
                    </div>
                {%else%}
                    {{form.weight(class="form-control form-
control-md")}}
                {%endif%}
            </div>
            <div class="form-group">
                {{form.height.label(class="form-control-label")}}

                {%if form.height.errors%}
                    {{form.height(class="form-control form-
control-md is-invalid")}}
                    <div class="invalid-feedback">
                        {%for error in form.height.errors%}
                            <span>{{error}}</span>
                        {%endfor%}
                    </div>
                {%else%}
                    {{form.height(class="form-control form-
control-md")}}
                {%endif%}

            </div>
            <div class="form-group">
                {{form.age.label(class="form-control-label")}}

                {%if form.age.errors%}
                    {{form.age(class="form-control form-control-
md is-invalid")}}
                    <div class="invalid-feedback">
                        {%for error in form.age.errors%}
                            <span>{{error}}</span>
```

```
                                        {%endfor%}
                                    </div>
                                {%else%}
                                    {{form.age(class="form-control form-control-
md")}}
                                {%endif%}
                            </div>
                            {% for subfield in form.gender %}
                                <div class="form-check">
                                    {{ subfield(class="form-check-input") }}
                                    {{ subfield.label(class="form-check-label") }}
                                </div>
                            {% endfor %}

                            <h4 style="margin-bottom:3px">Physical Activity</h4>
                            {% for subfield in form.physical_activity %}
                                <div class="form-check">
                                    {{ subfield(class="form-check-input") }}
                                    {{ subfield.label(class="form-check-label") }}
                                </div>
                            {% endfor %}

                            {{form.submit(class="btn btn-success")}}

                        </form>
                    {% endblock %}
                </div>
            </body>
            </html>

            <!DOCTYPE html>
            <html lang="en">

            <!--        this page auther: Tangqi Feng  -->

            <head>
                <meta charset="utf-8">
                <meta http-equiv="X-UA-Compatible" content="IE=edge">
                <meta name="viewport" content="width=device-width, initial-scale=1">
                <!-- The above 3 meta tags *must* come first in the head; any other head
```

```
content must come *after* these tags -->
    <title>BMI-calculator</title>

    <!-- Bootstrap -->
    <!-- Latest compiled and minified CSS -->
    <link rel="stylesheet"
href="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/css/bootstrap.min.css"
integrity="sha384-
BVYiiSIFeK1dGmJRAkycuHAHRg32OmUcww7on3RYdg4Va+PmSTsz/K68vbdEj
h4u" crossorigin="anonymous">


    <!-- HTML5 shim and Respond.js for IE8 support of HTML5 elements and media
queries -->
    <!-- WARNING: Respond.js doesn't work if you view the page via file:// -->
    <!--[if lt IE 9]>
      <script
src="https://oss.maxcdn.com/html5shiv/3.7.3/html5shiv.min.js"></script>
      <script src="https://oss.maxcdn.com/respond/1.4.2/respond.min.js"></script>
    <![endif]-->

    <!--auther: Tangqi Feng-->
    <script type="text/javascript" src="{{mainJs}}"></script>


    <link rel="stylesheet" href="{{registerCss}}" type="text/css" />
</head>

<body background="{{registerBkg}}" style="backgrond-size:cover">

    <!-- jQuery (necessary for Bootstrap's JavaScript plugins) -->
    <script
src="https://ajax.googleapis.com/ajax/libs/jquery/1.12.4/jquery.min.js"></script>
    <!-- Include all compiled plugins (below), or include individual files as needed -->
    <!-- Latest compiled and minified JavaScript -->
    <script
src="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/js/bootstrap.min.js"
integrity="sha384-
Tc5IQib027qvyjSMfHjOMaLkfuWVxZxUPnCJA7l2mCWNIpG9mGCD8wGNIcPD7
Txa" crossorigin="anonymous"></script>

    <div class="col-md-4 column" id="login" style="margin-left:40%;margin-
```

```
        top:12%;">
                    <img width="100" height="100" src="{{register}}" />
                    <form action="/register" method="post">
                        <p class="text1">user name：</p>
                        <p class="text1">
                            <input name="username" type="text" style="width: 240px; height:
        25px;" />
                        </p>
                        <p class="text1">password：</p>
                        <p class="text1">
                            <input name="password" type="password" style="width: 240px;
        height: 25px;" />
                        </p>
                        <p class="text3">{{get_flashed_messages()[0]}} </p>
                        <p class="text1">

                            <button onclick="submit" style="margin: 0; padding: 0; border-
        width: 0;"><img width="70" height="25" src="{{registerButton}}" /></button>
                            <a style="font-size:10px; margin-left:15px;" href="/">back to log in
        !</a>
                        </p>
                    </form>
                </div>

        </body>

        </html>

<!DOCTYPE html>
<html lang="en">

<!--        this page auther: Tangqi Feng  -->

<head>
    <meta charset="utf-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1">
    <!-- The above 3 meta tags *must* come first in the head; any other head content must
come *after* these tags -->
    <title>BMI-calculator</title>
```

```
    <!-- Bootstrap -->
    <!-- Latest compiled and minified CSS -->
    <link rel="stylesheet"
href="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/css/bootstrap.min.css"
integrity="sha384-
BVYiiSIFeK1dGmJRAkycuHAHRg32OmUcww7on3RYdg4Va+PmSTsz/K68vbdEjh4u"
crossorigin="anonymous">


    <!-- HTML5 shim and Respond.js for IE8 support of HTML5 elements and media queries
-->
    <!-- WARNING: Respond.js doesn't work if you view the page via file:// -->
    <!--[if lt IE 9]>
      <script src="https://oss.maxcdn.com/html5shiv/3.7.3/html5shiv.min.js"></script>
      <script src="https://oss.maxcdn.com/respond/1.4.2/respond.min.js"></script>
    <![endif]-->

    <!--auther: Tangqi Feng-->
    <script type="text/javascript" src="{{mainJs}}"></script>



    <link rel="stylesheet" href="{{registerCss}}" type="text/css" />
</head>

<body background="{{registerBkg}}" style="backgrond-size:cover">

    <!-- jQuery (necessary for Bootstrap's JavaScript plugins) -->
    <script src="https://ajax.googleapis.com/ajax/libs/jquery/1.12.4/jquery.min.js"></script>
    <!-- Include all compiled plugins (below), or include individual files as needed -->
    <!-- Latest compiled and minified JavaScript -->
    <script src="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/js/bootstrap.min.js"
integrity="sha384-
Tc5IQib027qvyjSMfHjOMaLkfuWVxZxUPnCJA7l2mCWNIpG9mGCD8wGNIcPD7Txa"
crossorigin="anonymous"></script>

    <div class="col-md-4 column" id="login" style="margin-left:40%;margin-top:12%;">
            <img width="100" height="100" src="{{register}}" />
            <form action="/register" method="post">
                <p class="text1">user name : </p>
                <p class="text1">
                    <input name="username" type="text" style="width: 240px; height: 25px;" />
```

```
                </p>
                <p class="text1">password : </p>
                <p class="text1">
                    <input name="password" type="password" style="width: 240px; height:
25px;" />
                </p>
                <p class="text3">{{get_flashed_messages()[0]}} </p>
                <p class="text1">

                    <button onclick="submit" style="margin: 0; padding: 0; border-width:
0;"><img width="70" height="25" src="{{registerButton}}" /></button>
                    <a style="font-size:10px; margin-left:15px;" href="/">back to log in !</a>
                </p>
            </form>
        </div>

</body>

</html>

{% extends "home.html" %}
{% block main %}
   <table id="chart">
      <tr>
         <th>
            <center>DIET CHART</center>
         </th>
      </tr>
      <tr>
         <td>Breakfast: {{ breakfast }}</td>
      </tr>

               {%if snack1 %}
      <tr>
         <td>Snack: {{ snack1 }}</td>
      </tr>
      {%endif%}

      <tr>
         <td>Lunch: {{ lunch }}</td>
```

```
        </tr>
        <tr>
            <td>Snack: {{ snack2 }}</td>
        </tr>
        <tr>
            <td>Dinner: {{ dinner }}</td>
        </tr>
        <tr>
            <td>Snack: {{ snack3 }}</td>
        </tr>
    </table>
    <button type="button" class="btn btn-success" onClick= "location.href =
'{{url_for("home") }}' " role="button">Back</button>
{% endblock %}
```

```
from random import randint

protein = ['Yogurt(1 cup)','Cooked meat(85g)','Cooked fish(100g)','1 whole egg + 4
egg whites','Tofu(125g)']
fruit = ['Berries(80g)','Apple','Orange','Banana','Dried Fruit(Handfull)','Fruit
Juice(125ml)']
vegetable = ['Any vegetable(80g)','Leafy greens(Any Amount)']
grains = ['Cooked Grain(150g)','Whole Grain Bread(1 slice)','Half Large
Potato(75g)','Oats(250g)','2 corn tortillas']
protein_snack = ['Soy nuts(30g)','Low fat milk(250ml)','Hummus(4 Tbsp)','Cottage
cheese (125g)','Flavored yogurt(125g)']
taste_enhancer = ['2 TSP (10 ml) olive oil','2 TBSP (30g) reduced-calorie salad
dressin','1/4 medium avocado','Small handful of nuts','1/2 ounce  grated Parmesan
cheese','1 TBSP (20g) jam, jelly, honey, syrup, sugar']



def calc_tdee(name,weight,height,age,gender,phys_act):
if gender=='Female':
  bmr = 655 + (9.6 * weight) + (1.8 * height ) - (4.7 * age)
else:
  bmr = 66 + (13.7 * weight) + (5 * height ) - (6.8 * age)

if phys_act == 'value1':
  tdee= bmr*1.2
elif phys_act == 'value2':
  tdee= bmr*1.375
```

```
elif phys_act == 'value3':
  tdee= bmr*1.55
elif phys_act == 'value4':
  tdee= bmr*1.735
else:
  tdee=bmr*1.9
return tdee


def bfcalc(tdee):
breakfast = protein[randint(0,len(protein)-1)]+", "
breakfast += fruit[randint(0,len(fruit)-1)]

if tdee>=2200:
  breakfast+=", "+grains[randint(0,len(grains)-1)]

return breakfast


def s1calc(tdee):
snack1=""
if tdee>=1800:
  snack1 = protein_snack[randint(0,len(protein_snack)-1)]

return snack1

def lcalc(tdee):
lunch=""
lunch+=protein[randint(0,len(protein)-1)]+", "
lunch+=vegetable[randint(0,len(vegetable)-1)]+", "
lunch+="Leafy greens, "
lunch+=taste_enhancer[randint(0,len(taste_enhancer)-1)]+", "
lunch+=grains[randint(0,len(grains)-1)]

if(tdee>=1500):
  lunch+=", " + fruit[randint(0,len(fruit)-1)]

if(tdee>=1800):
  lunch+=", " + protein[randint(0,len(protein)-1)] + ", "
  lunch+=vegetable[randint(0,len(vegetable)-1)]
```

```
return lunch

def s2calc(tdee):
snack2=protein_snack[randint(0,len(protein_snack)-1)]+", "
snack2+=vegetable[randint(0,len(vegetable)-1)]
return snack2

def dcalc(tdee):
dinner=""
dinner+=protein[randint(0,len(protein)-1)]+", "
dinner+="2 vegetables 80g, "
dinner+="Leafy Greens, "
dinner+=grains[randint(0,len(grains)-1)]+", "
dinner+=taste_enhancer[randint(0,len(taste_enhancer)-1)]
if tdee>=1500:
  dinner+=", " + protein[randint(0,len(protein)-1)]
if tdee>=2200:
  dinner+=", " + grains[randint(0,len(grains)-1)]+", "
  dinner+=taste_enhancer[randint(0,len(taste_enhancer)-1)]
return dinner

def s3calc(tdee):
snack3=fruit[randint(0,len(fruit)-1)]
return snack3

from forms import UserInfoForm
from flask import Flask, render_template, flash,
  request,url_for,redirect
import algo
app=Flask(__name__)
app.config.from_object(__name__)
app.config['SECRET_KEY'] =
  '945a61eeffcee883e3b261a47b31ae47'

@app.route('/',methods=['GET','POST'])
@app.route('/home',methods=['GET','POST'])
def home():
  form=UserInfoForm()
  if form.validate_on_submit():
          if request.method=='POST':
```

```
                name=request.form['name']
                weight=float(request.form['weight'])
                height=float(request.form['height'])
                age=int(request.form['age'])
                gender=request.form['gender']
                phys_act=request.form['physical_activity']


        tdee=algo.calc_tdee(name,weight,height,age,gender,phys_
  act)
                return redirect(url_for('result',tdee=tdee))

  return render_template('home.html',title="Diet App",form=form)

@app.route('/result',methods=['GET','POST'])
def result():
  tdee=request.args.get('tdee')
  if tdee is None:
        return render_template('error.html',title="Error Page")

  tdee=float(tdee)
  breakfast= algo.bfcalc(tdee)
  snack1=algo.s1calc(tdee)
  lunch=algo.lcalc(tdee)
  snack2=algo.s2calc(tdee)
  dinner=algo.dcalc(tdee)
  snack3=algo.s3calc(tdee)
  return
  render_template('result.html',title="Result",breakfast=breakfast,sna
  ck1=snack1,lunch=lunch,snack2=snack2,dinner=dinner,snack3=sn
  ack3)

if __name__ == '__main__':
    app.run(debug=True)

  from flask_wtf import FlaskForm
  from wtforms import Form, TextField, TextAreaField, validators,
  StringField, SubmitField, IntegerField, RadioField,FloatField
  from wtforms.validators import DataRequired, Length
  class UserInfoForm(FlaskForm):
```

```
    name = StringField('Name:',
                                        validators=[DataRequired(),
Length(min=2,max=20)])
    weight = IntegerField('Weight:',
validators=[DataRequired(message="No valid value")])
    height = FloatField('Height:',
validators=[DataRequired(message="No valid value")] )
    age = IntegerField('Age:',
validators=[DataRequired(message="No valid value")])
    gender =
RadioField('Gender',choices=[('Male','Male'),('Female','Female')],de
fault='Male',validators=[DataRequired()])
    physical_activity=RadioField('Physical Activity',
                                                    choices=[

        ('value1','Sedentary(little or no exercise)'),

        ('value2','Light Active(1-3 days/week)'),

        ('value3','Moderately Active(3-5 days/week)'),

        ('value4','Very Active(6-7 days/week)'),

        ('value5','Super Active(twice/day)')

                                                                ],
                                                    default='value1',

        validators=[DataRequired()])
    submit = SubmitField('Submit')
```

B. SCREENSHOTS

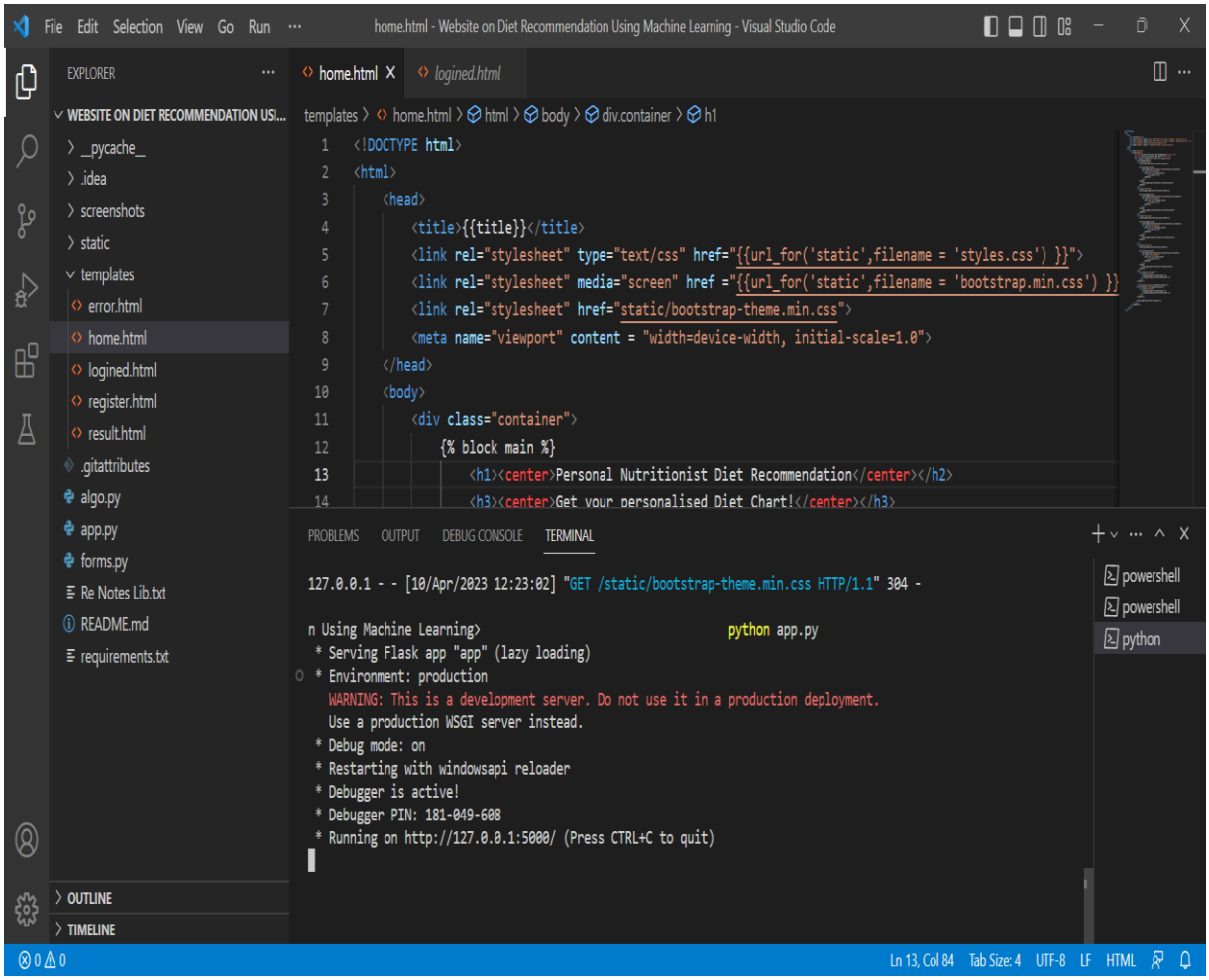

Fig.B1 Implementation of code

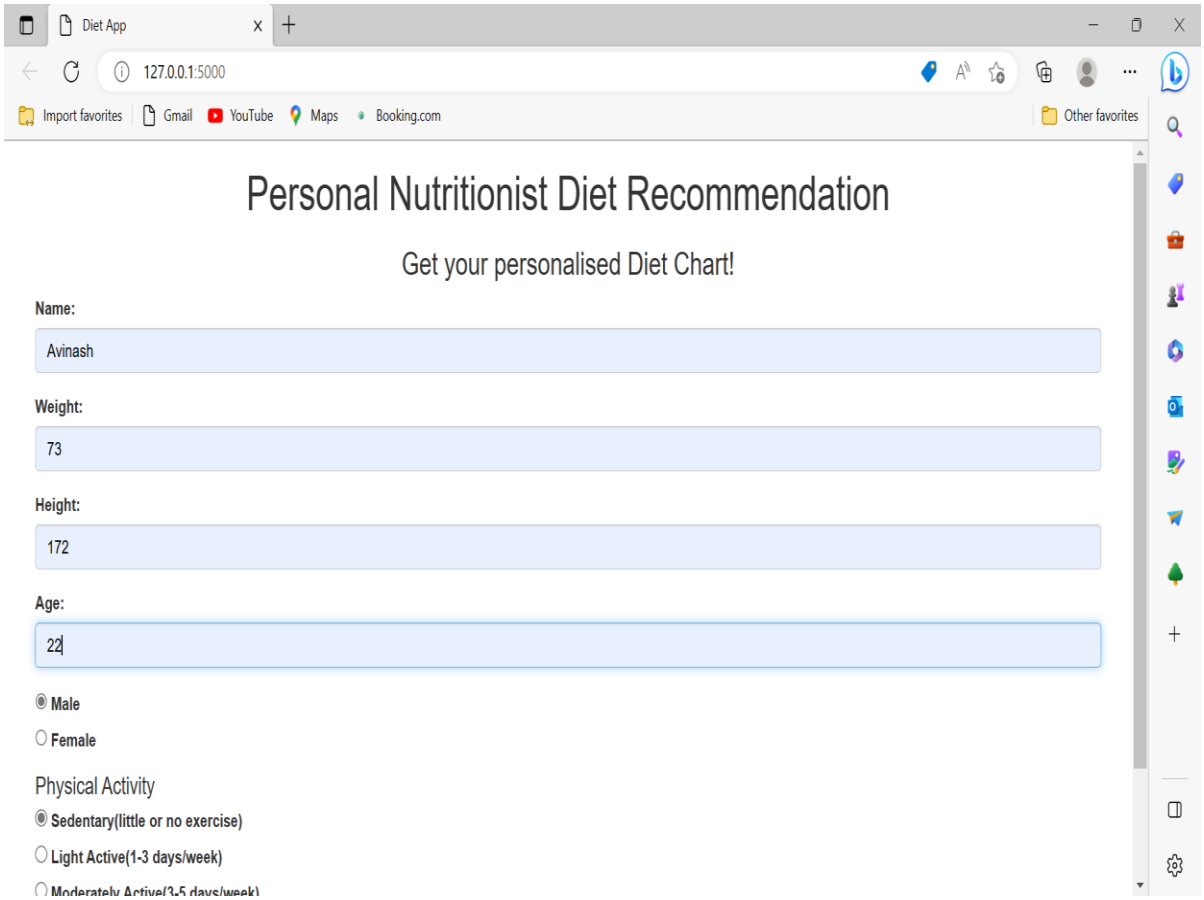

Fig.B2 – Getting input data

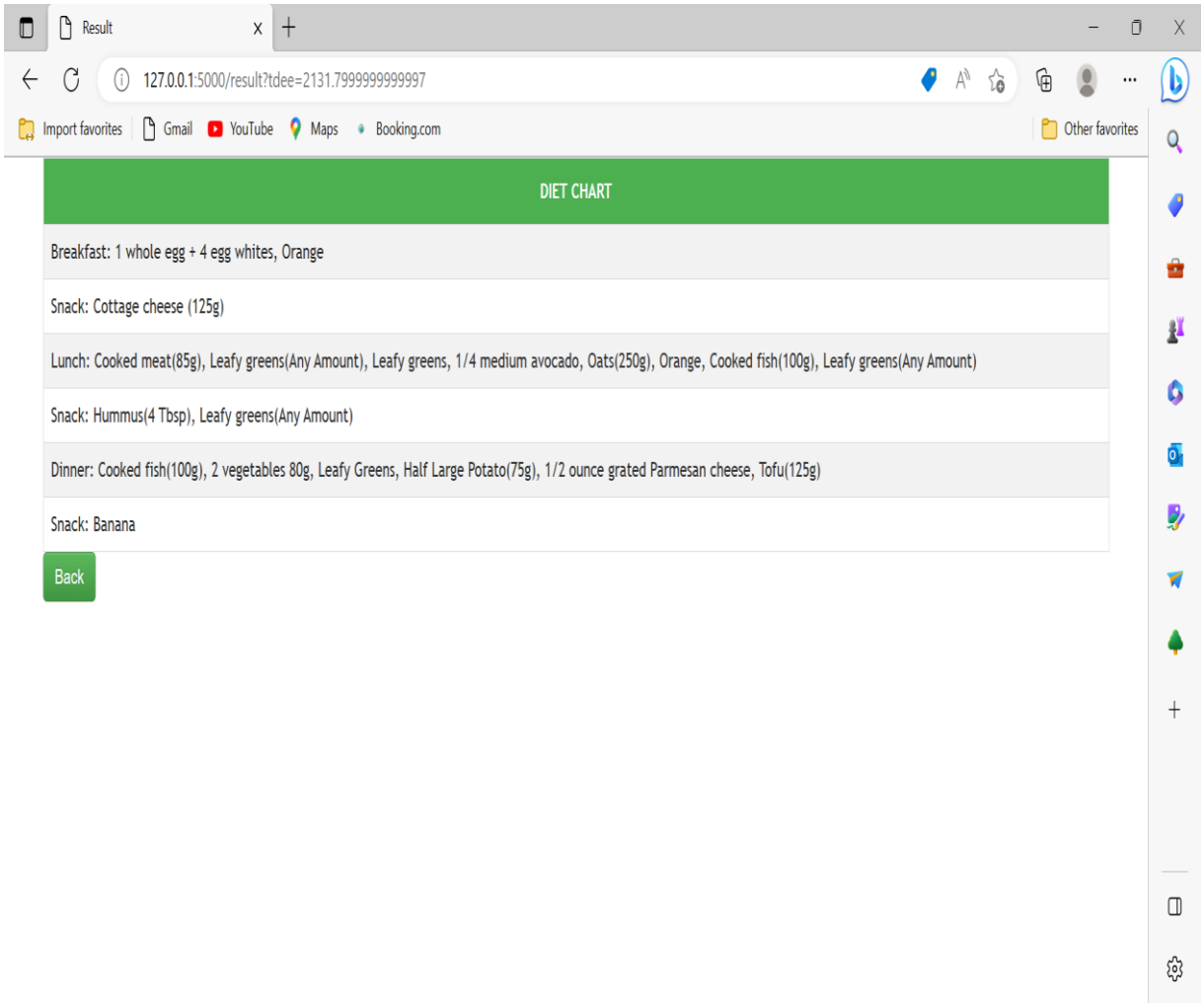

Fig.B3 Diet Chart

C. RESEARCH PAPER

Personal nutritionist Diet recommendation system based on user health information

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Abstract— ***Building a customized food suggestion systems via machine learning is one of the main goals of this project, which intends to transform the way we think about diet and nutrition. In order to meet the unique nutritional and dietary requirements of each user, our system will evaluate their eating habits and historical nutritional data to recommend meals and foods that will help them reach their objectives. The adoption of sophisticated machine learning methods will help overcome the shortcomings of conventional dietary advice, such as a lack of individualization and the challenge of long-term adherence. Our algorithm will be able to spot trends and correlations that lesser-powered approaches would have missed by poring through massive datasets. To evaluate data and provide suggestions, we will use a mix of supervised & unsupervised learning techniques. Individualized dietary and nutritional recommendations will be generated by the system when it has been trained on a large dataset of user inputs. Our technology will not only provide individualized diet programmers, but it will also have the capability of modifying its suggestions in real time in response to user input. This will make dietary and nutritional planning more flexible and responsive. The project's overarching objective is to facilitate consumers' access to and consumption of healthful foods while simultaneously fostering long-term viability. We think we can make a big difference in the realm of nutrition and assist people in meeting their dietary objectives by using machine learning.***

Keywords—: KNN, Decision Tree Calories, BMI, Diet Plan, Recommendation System, Random Forest, Machine Learning

I. INTRODUCTION

Humans currently face a wide range of health issues, including those related to exercise, nutrition, the mind, etc. Research shows that poor dietary habits are a key contributor to a wide range of health problems & illnesses. According to a WHO research, improper nutrition is responsible for about 10% of all fatalities from stroke, 11percent of all deaths from is chasmic cardiovascular disease, & 14 percent of all fatalities from gastric malignancy. Also, an estimated 0.25B children have vit A insufficiency, while an additional 0.2B have iron shortage (megaloblastic), while 0.7 b lacking sufficient iodine in their diets. This project's primary goal is to suggest dietary changes for various people. The recommendation system handles the massive amounts of data available by prioritizing what's most relevant for a given person depending on their input and other characteristics that account for their preferences and interests. Recommendations are made depending on the user's structural qualities (aged, ethnicity, size, obesity, & fat mass %), as well as their preferences and interests. There are three main steps involved in making a suggestion: gathering relevant data, analyzing that data, and finally making a suggestion. First, data is gathered on a specific issue, and then the many potential solutions to that issue are classified. This is followed by the Process Of learning, in which different inferences are drawn from the data collected, and finally the Recommendations Process, in which a set of specific suggestions is provided as an output. As a result of the user's characteristics, preferences, and BMI, our program will provide recommendations tailored specifically to each individual.

A. Description of the problem

The dramatic increase in consumed quick meal has resulted in an increase in the intake of harmful foods. Causes weight gain, hyperglycaemia, hypertension, and other medical conditions. Therefore, eating a healthy, well-balanced diet is now a must. However, in today's fast-paced world, many people are unable afford to consult with a dietician & nutritionist on a regular basis to have them monitor their wellness or provide tailored advice about how to eat well. This paper addresses the problem of people's poor dietary habits and offers recommendations for improving their health.

II. OBJECTIVES

First, the research aims to include the user's lifestyle choices into the state's solution for constructing and recommending a nutritious and balanced meal plan.

Second, things that may assist with weight maintenance are eating a balanced, nutritious diet and performing workout. However, the advantages of healthy eating go well beyond just weight control.

Third, the 70:30 guideline is the key to fitness. For example, an individual who wishes to maintain their wellness should concentrate 70% of your efforts on nutrition, 30% on exercise, and you don't need to define your rms. If at all possible, avoid using acronyms in the title or headings.

III. LITERATURE REVIEW

The artificial bee colony method [1] was used to create a custom food suggestion system for meeting daily nutritional needs. In order to generate menus effectively, the authors suggest using a genetic algorithm, and they propose using a system that employs based approach thinking and hazy ontology to create food and nutrition recommendations. Unfortunately, the data on the user's everyday routines and energy supplies came from the user's Google Fit API. Users may not be good candidates for this system if they do not have access to their illness records, since the system depended on these records to create individualized food recommendations. This severely limits the potential user base of the system.

The authors of [2] describe a diet recommendation engine for diabetes patients based on a clustered assessment. They argued that proper diet is the foundation of a long and happy life. Nevertheless, the researchers [3] calculated daily nutritional need based on solely the physical customer data, as opposed to employing long-term data for meal suggestion. The research also fell short in its presentation of a method that would tackle dietary & pleasure optimization concurrently. Our method incorporates user and product data for both the near and far futures to guarantee the safety of people with illnesses. The authors of [4] conducted an evaluation of several pharmaceuticals record keeping whose stated goal is to notify capacity constraints. They integrated supplier web pages and a number of batch recall registry databases into their solution. According to the results of the study, it is very desirable to include nutritional and dietary information utilized in clinical settings in medical record keeping registries. In this investigation, we have collected data using Python and used Machine Learning to the merchandise. Using a registry-based warning system and an AI-powered automated notice, we've additionally catered to the specific dietary restrictions of particular patients.

Patients' [5] unique dietary and nutritional preferences are modelled inside the patient diet advice system. While this research does a good job of forecasting balanced diets for individuals & registered dieticians, its lack of an useful methodology and its modest success in tailoring solutions to individual patients' needs are drawbacks. To solve this problem, we use a more refined LSTM technique in our model, which allows us to more precisely meet the requirements of each individual patient.

Another research by [6] created a nutrition support system that provides input on a participant's eating habits and facilitates behavior change using a variety of persuasive aspects such self-monitoring, personalization, analysis, adoption, suggestions, & monitoring. While an autonomous nutrition proposed method may have certain advantages over human nutritionists, it still has several serious drawbacks in areas such as usability, efficiency, effectiveness, and customer satisfaction. The method established by [6] has to be refined in light of the provided criticism so that it can serve as a useful mobile platform app in the long run. The results of this investigation indicate that our suggestion is well received. As the authors of [7] point out, their methodology isn't suitable for use in dietary guidance.

But outlining their technique to send out signals early and give potential dietary/food suggestions to patients would bring more realism and fill a need in the study. One of the things this paper adds is this. There's a parallel between this and the Diet Organizer System proposal seen in [8]. Using a user-compiled version of a real-time dynamic survey developed by medical physicians, they were able to generate a profile. The DIETOS system is able to advise not only foods that belong to the exact same group and have a comparable health grade, but also foods that link to nutrition in some way for a certain group of health conditions.[9]

Recently, machine - learning technology has been implemented into several recommendation systems. [10,11] Until then, patients' limited health literacy hinders their ability to get the health records they need and choose an appropriate health product from the many available options presented by popular OHCs, such as the one developed by the authors of [12]. In the current setup, this proposal was boosted by the implementation of automation into our model. Without sufficient data analysis, additional Recommender models have been presented, such as [13], which employ different algorithms to provide customers with items and services. Authors [14, 15] have voiced similar concerns, arguing that the medical industry has been slow to adopt big data analytics. They then went on to suggest five different ways in which healthcare facilities may use big data analytics. In contrast, the hardware device described and constructed in [16] can collect a large amount of data about processed products, analyses it, and upload the results to the cloud, where they may be used to provide users with dietary and nutritional guidance.

Further, [17] offered a number of methods for visualizing healthcare data social media as a dispersed healthcare information network. Based on their findings, operational techniques work better than content-based ones when dealing with unpredictable consumers.

IV. PROPOSED METHOD

The software employs a ml framework to analyse user inputand provide a personalised diet program.

Our dataset is now split into three groups:
1.Lunchdata
2.Breakfastdata
3.Dinnerdata

That's why we provide the Machine learning model with such a variety of data during training to ensure it produces the greatest possible outcomes. In this work, we primarily used 2 algorithms:

1.K-Means
2.RFA

If the user enters new information and selects other categories—such as "healthy diet," "fat growth," or "fat loss"—the computer will generate a diet plan for them.

A. K MEANS ALGORITHM

Iteratively, the Kmeans method seeks to divide the data set into a number of separate, quasi groupings (clusters), to which each piece of information is assigned. It aims to maintain the greatest feasible distance between groupings while making based on inter pieces of data as comparable as possible. It places data points into groupings that ensure that the average of the squares distances among these locations as well as the midpoint of that grouping (the mathematical average of all the pieces of data in that group) is minimised. Less variance across clusters means that data items within a given group are much more homogenous.

Kmeans method operates as follows:

1. Determine how many groups (clusters) you want to analyze.

2. Shuffle the data, & then choose K pieces of data randomly, before replacing them, to serve as initial cluster centers.

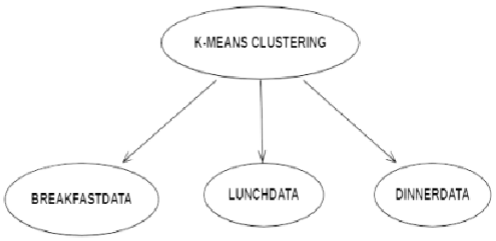
3. Iterate until the centered points do not shift any more. data sets are still being consistently grouped into groups.

4. Calculate the total square distance matrix & the cluster centers.

5. Place each observation in its most intuitive grouping (centroid).

6. Aggregate each of the data sets within every cluster to get their centers.

The following graphic demonstrates how we used the k- means similarity measure to partition our data set into three separate groups representing brunch, lunch, & supper. Following this, the randomized forests approach is used to create the network for each of the 3 classifications, as well as the data is split into a test & training set.



B. RANDOM FOREST ALGORITHM

The RF algorithm is a kind of controlled classifier. The goal, as implied by the name, is to generate a rf. However, it's important to keep in mind that making a forestry is different from making a choice using a gain score or mutual information strategy. As a means of aiding in making choices, the decision tree is useful. It displays the potential outcomes using a tree-like structure. If you provide the decision tree a learning algorithm including goals & characteristics, it will generate some rules. You may use these guidelines to make forecasts.We use Random forest to generate categories from our data after partitioning it into three distinct groups.

If you feed a training dataset including labels & features into a decision tree, the tree will generate a set of rules that can be applied to future fault forecasting. This is what a rf is: a collection of decision trees working in concert.

V. DESIGN AND IMPLEMENTATION

A. User Flow

When a user submits their observable traits to the platform, the ML model will respond with dietary recommendations that take into account the user's individual needs and preferences and may be broken down into three meals per day (brunch, midday, & supper).

B. Architecture of our system

1. The first step is for users to fill out the required fields on the site, which include demographic data such gender, age, & bodyweight.

2. Second, the data will be processed by the ML model as follows.

- Clusters using K-Means is used to classify foods bycaloric content. 2.1
- Meal products are classified and predicted using aninput-driven Random Forest Classification 2.2.

3. Third, once the information analysis is complete, the software will reply by displaying the person's body mass index and the patient's present situation (Underweight, Overweight, Fit).

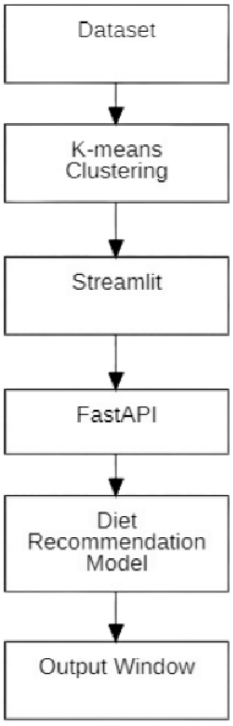
4. Following the needs of the user, the algorithm will suggest a three-meal per day diet program (morning, noon, and night).

5. Clients may customize their diets by selecting from a

variety of suggested products.

6. After the user selects foodstuffs, our software would compute the total amount of calories in those foods and provide a ratio to the individual 's overall calorie requirements.

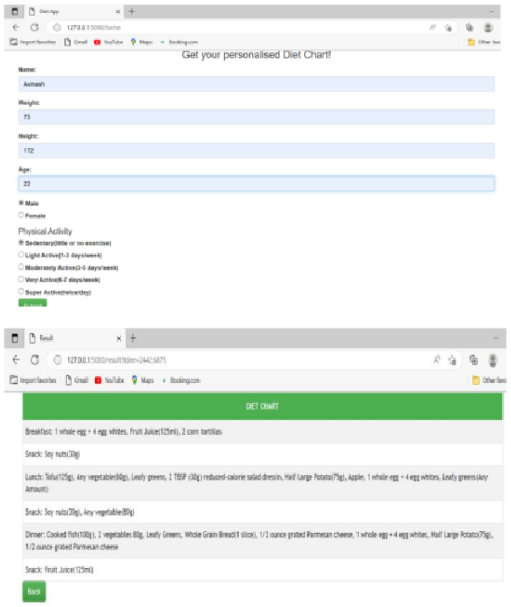
7. The patient's regimen would be tailored to this information.



Flowchart

RSEULT

We've built a website that uses BMR to provide meal recommendations based on a patient's ages, sex, & level of activity on a daily basis. The first step in learning the method is to divide the foodstuff into three piles, one for each of the three main meals of the day (morning, noon, & night). Vitamins are organized into groups according to their importance in achieving certain fitness goals, such as slimming down, bulking up, or staying in excellent health. After grouping is completed, a Random Forest classification is used to determine which nearby foods are most appropriate for the recommended diet.. On the basis of body mass index, our diet suggestion system provides consumers with optimally proportioned meal ideas.



VII. CONCLUSION

Artificial intelligence and machine learning are key technological developments for the expansion of the IT industries. With the help of these methods, we have developed a resource for anyone seeking dietary advice and information on how to improve their wellness. When a person enters their choices and information about themselves into the platform, it generates a nutritious meal plan that may help them achieve their fitness & nutrition goals

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